STATE OF COLORADO

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Jane E. Norton, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department of Public Health and Environment

June 8, 2001

Dear Interested Citizens:

Enclosed is the Proposed Plan for the Summitville Mine Superfund site. The following information is a quick summary of the more detailed plan. A PUBLIC MEETING has been scheduled for JUNE 20TH AT THE CAPULIN COMMUNITY CENTER - 7 P.M. At this time we will be requesting your comments on the alternatives for cleanup of the site.

At every Superfund site a process which is prescribed by law calls for a thorough study of the problems at the site and a report called the Remedial Investigation/Feasibility Study. Using the information in the Feasibility Study, the Colorado Department of Public Health and Environment (CDPHE) and the Environmental Protection Agency (EPA) put forth several alternatives for cleaning up the site. This is called the Proposed Plan. The CDPHE and EPA brings this Plan to the public for their suggestions and comments. A preferred alternative and the rationale for that choice is listed in the Proposed Plan document.

What is in the Proposed Plan?

It contains information on several important aspects of the plan, including: a) opportunities for public involvement, b) site background, c) site characteristics, d) risks presented by the site, e) contaminants of concern, f) goals for a cleanup plan, and g) a list of the alternatives for cleanup. The alternatives considered include the options and costs of this work and are presented in a chart that compares the alternatives. CDPHE and EPA identify a preferred alternative which is highlighted for your consideration.

At the Summitville Mine site, EPA and CDPHE looked at numerous possibilities for final cleanup of the site. Many proved to be impractical and were screened out. Six possibilities remained for serious consideration. All of the alternatives, with the exception of the “no action” alternative, have several common factors. The alternatives hope to accomplish the goal of controlling and treating contaminated surface and ground water, re-establishing a viable fishery, ensuring stable dams and slopes, stopping erosion at the site, and controlling air-borne contaminants. This Proposed Plan is for the final work being considered at the site. Much work has already been done to get the site ready for this step.

What are the Alternatives?

Each of the alternatives looked at some form of water treatment, water diversion systems, and an impoundment storing contaminated water for treatment. The water treatment system varied from continued use of the current system to putting in a whole new system downstream of a new larger storage impoundment. The alternative which the agencies prefer builds a new water treatment plant, maintains an impoundment for storage of contaminated water, upgrades to Wightman Fork Diversion and site ditches, and rehabilitation of the Reynolds and Chandler Adits. The cost for the preferred alternative is about $75,000,000 to be spent over 100 years. This includes capital costs and long-term operation and maintenance costs. An engineering design will be done after a Record of Decision is published which will give much more detail on how the plan is to be implemented.

What's Next?

After citizens review the Proposed Plan, EPA and CDPHE will make a final selection from one of the alternatives listed in the plan. A Record of Decision (ROD) will then be signed, design work will begin, and bids will be let to do the actual work.

We want to hear what you think of this plan. The attached Proposed Plan document lists where you can find records from the site and where to send your comments. Thank you for your interest in this site. If you have any questions, call me at 1-888-569-1831.

Sincerely,

Austin Buckingham
Summitville Mine Superfund Site
State Project Manager

enclosure

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PROPOSED PLAN FOR SUMMITVILLE MINE

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Denver, Colorado
June 2001

On-Site Study Area - Operable Unit 5
Summitville Mine Superfund Site
Rio Grande, Colorado

ANNOUNCEMENT OF PROPOSED PLAN

This ***Proposed Plan***[1] identifies the ***preferred alternative*** for ***Operable Unit*** 5, final remedial action at the Summitville Mine Superfund site (site). The purpose of the Proposed Plan is to inform and solicit the views of citizens on the preferred alternative. To facilitate public input, the Proposed Plan reviews the site background and provides a description of the site characteristics, discusses interim remedial actions performed at the site and their effectiveness, summarizes the alternatives developed to address Operable Unit 5 and provides rationale for selection of the preferred alternative. This document is issued by the Colorado Department of Public Health and Environment (CDPHE), the lead agency for the site-wide ***Remedial Investigation*** and ***Feasibility Study***, and the U.S. Environmental Protection Agency Region 8 (EPA). A ***Record of Decision*** for Operable Unit 5 is expected in fall 2001.

- - - Preferred Alternative - - -

- **U** New water treatment plant/flexible treatment season
- **U** Impoundment for storage of contaminated water
- **U** Upgrade of Wightman Fork Diversion and site ditches
- **U** Rehabilitation of Reynolds and Chandler Adits

The CDPHE and EPA prepared this Proposed Plan to fulfill the requirements of Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and 40 CFR § 300.430(f)(2) of the ***National Oil and Hazardous Substance Pollution Contingency Plan*** (NCP). Under these regulations, the public is provided a 30-day period to submit comments on this Proposed Plan. Detailed information on site contamination and clean-up alternatives is provided in the Draft Remedial Investigation and Draft Feasibility Study reports. These and other site documents in the ***Administrative Record*** are available at the information repositories listed in the *Highlight* section.

1 Words in ***bold italics*** are defined in the glossary.

- - - HIGHLIGHT - - -

OPPORTUNITIES FOR PUBLIC INVOLVEMENT

Public Comment Period: June 13 through July 11, 2001

Public Meeting:
June 20, 2001 at 7:00 p.m.
Community Center
Capulin, Colorado

Send Written Comments to Either of the Following:
Ms. Austin Buckingham (State Project Manager)
CDPHE (HMWMD-RP-B2)
4300 Cherry Creek Drive South
Denver, CO 80246-1530
e-mail: austin.buckingham@state.co.us

Mr. Victor Ketellapper (EPA Remedial Project Manager)
U.S. EPA (8EPR-SR)
999 18th Street, Suite 500
Denver, CO 80202-2466
e-mail: ketellapper.victor@epamail.epa.gov

Information Repositories:
Del Norte Public Library
790 Grand Avenue
Del Norte, CO 81131

U.S. Department of Agriculture Service
Conejos County Natural Resources Conservation Service
15 Spruce
La Jara, CO 81140

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Records Center, Room B-215
4300 Cherry Creek Drive South
Denver, CO 80246-1530

U.S. Environmental Protection Agency
Region 8 Superfund Records Center
999 18th Street, Suite 50
Denver, CO 80202-2466

While the Proposed Plan identifies the preferred alternative, new information or arguments presented to the CDPHE and EPA during the public comment period could result in the selection of a final site-wide remedial action that differs in some way from the preferred alternative presented in this Proposed Plan and detailed in the Feasibility Study. Consequently, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan. Verbal or written comments may be submitted during the public meeting, or written comments may be submitted to the CDPHE or EPA Project Managers. Upon timely request, the public comment period may be extended an additional 30 days. Such requests must be made in writing to the CDPHE or EPA Project Managers, postmarked no later than July 11, 2001.

SITE BACKGROUND

The Summitville Mine site is located in the San Juan Mountains of south central Colorado (Figure 1), about 40 miles west of Alamosa, Colorado. Mining in the Summitville District has occurred since the 1870s, when gold was discovered on South Mountain. Shortly thereafter, miners began driving shafts and adits to access gold-bearing veins. The Reynolds Adit (Figure 2), the lowermost adit in South Mountain, was completed about 1906 to serve as an ore-haulage tunnel and to de-water the upper mine workings. Mining and ore processing operations occurred intermittently in the Summitville Mining District through 1992.

During the most recent mining operations (1984 through 1992), the South Mountain mineral reserves were developed as a large tonnage, open-pit operation. Gold and silver were extracted from the ore in a large, on-site Heap Leach Pad. ***Acid Mine Drainage*** (AMD) and cyanide releases from the open-pit mine and Heap Leach Pad operation adversely impacted downstream water users and aquatic life in the Alamosa River and San Luis Valley. The mine operator declared bankruptcy in December 1992 and the EPA assumed control of the site as part of an Emergency Response Removal Action. The site was added to the Superfund ***National Priorities List*** on May 31, 1994.

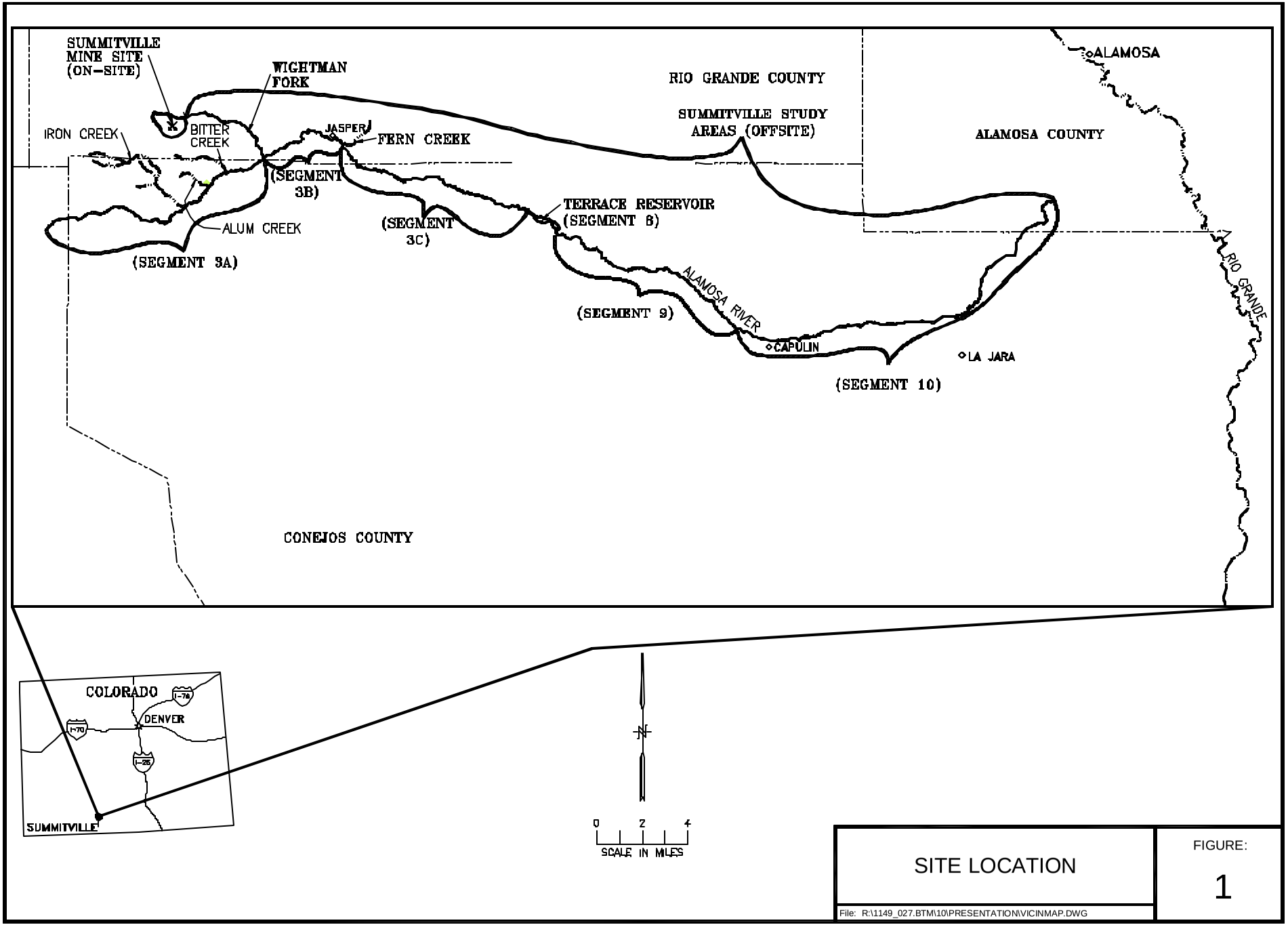
Releases of AMD from various sources in the Summitville Mining District have impacted surface water and sediments in the Alamosa River system downstream of the site (Figure 1). Copper is the primary contaminant of concern. In addition to impacts from the Summitville Mine site, the Alamosa River quality is degraded due to drainage from naturally mineralized areas that contribute metals and acidity (low pH) to the surface water system. Metals concentrations have decreased significantly in the Alamosa River downstream of Wightman Fork with the implementation of emergency and interim remedial actions at the Summitville Mine site. However, metals concentrations in the Alamosa River continue to exceed State of Colorado stream standards. Alamosa River water is exclusively used for agriculture purposes in the San Luis Valley. While soils in the San Luis Valley irrigated with Alamosa River water have been impacted, this impact has been demonstrated to not limit or otherwise adversely affect crop production capacity.

SITE CHARACTERISTICS

The terms "site" and "on-site" include the 1,231 originally permitted acres of the Summitville Mine. Areas outside the mine boundary, or "offsite," and potentially impacted by contaminants originating from the site, fall within the "Summitville study area" (Figure 1). The mine site contains approximately 572 acres of disturbed area, most of which is positioned on the northeastern flank of South Mountain (Figure 2). Elevations at the site range from 11,150 feet to approximately 12,300 feet at the highest extent of mine workings. The site is bounded by Wightman Fork to the north, Cropsy Creek to the south and east, and the mine workings of the South Mountain to the southwest. The annual total precipitation for Summitville averages about 40 inches. The annual total snowfall for the site averages 344 inches, or approximately 29 feet. The mine site is privately owned, but located within the U.S. National Forest system lands that make it desirable for recreation such as snow skiing, hiking, camping, hunting, and livestock grazing. However, access to the site is currently restricted to authorized personnel only.

Ground water contamination as a result of site activities is generally limited to the site itself. Metal contaminants frequently detected in ground water include copper, iron, manganese, and zinc (primary metals), and others to a lesser extent, and the pH is generally less than 4. Contamination of bedrock ground water in the mine pit area is due to the presence of highly mineralized and altered rock of the ore body, and was exacerbated during open-pit mining. Ground water quality generally improves downgradient of the mine pits and with depth. Groundwater contamination also occurs in the mine pool that occupies the underground workings and in the processed ore of the Heap Leach Pad. Minimal impact to alluvial aquifers downstream of the site has occurred.

The majority of surface water flow originates as precipitation runoff from snow melt during the spring, and from rainfall during the summer months. Acid mine drainage from the site is routed to the Summitville Dam Impoundment where it is stored for eventual treatment. ***Metal loading*** to the Summitville Dam Impoundment is greatest in the spring as a result of the high loading from surface water inputs (e.g., North Waste Dump and mine pits) and ground water inputs (e.g., Reynolds Adit and French Drain). Surface water quality exiting the site has improved in response to remedial and emergency actions performed by the EPA. The pH values measured at the downstream site boundary are increasing, and metals concentrations are decreasing. However, AMD that is not collected contributes to the metals load of Wightman Fork. Principal sources of surface water loading to Wightman Fork include site runoff, seepage, releases of untreated water from the Summitville Dam Impoundment, discharge from the Water Treatment Plant, and Cropsy Creek. Air dispersion from the site has had minimal impact on the environment.



SITE LOCATION

FIGURE: 1

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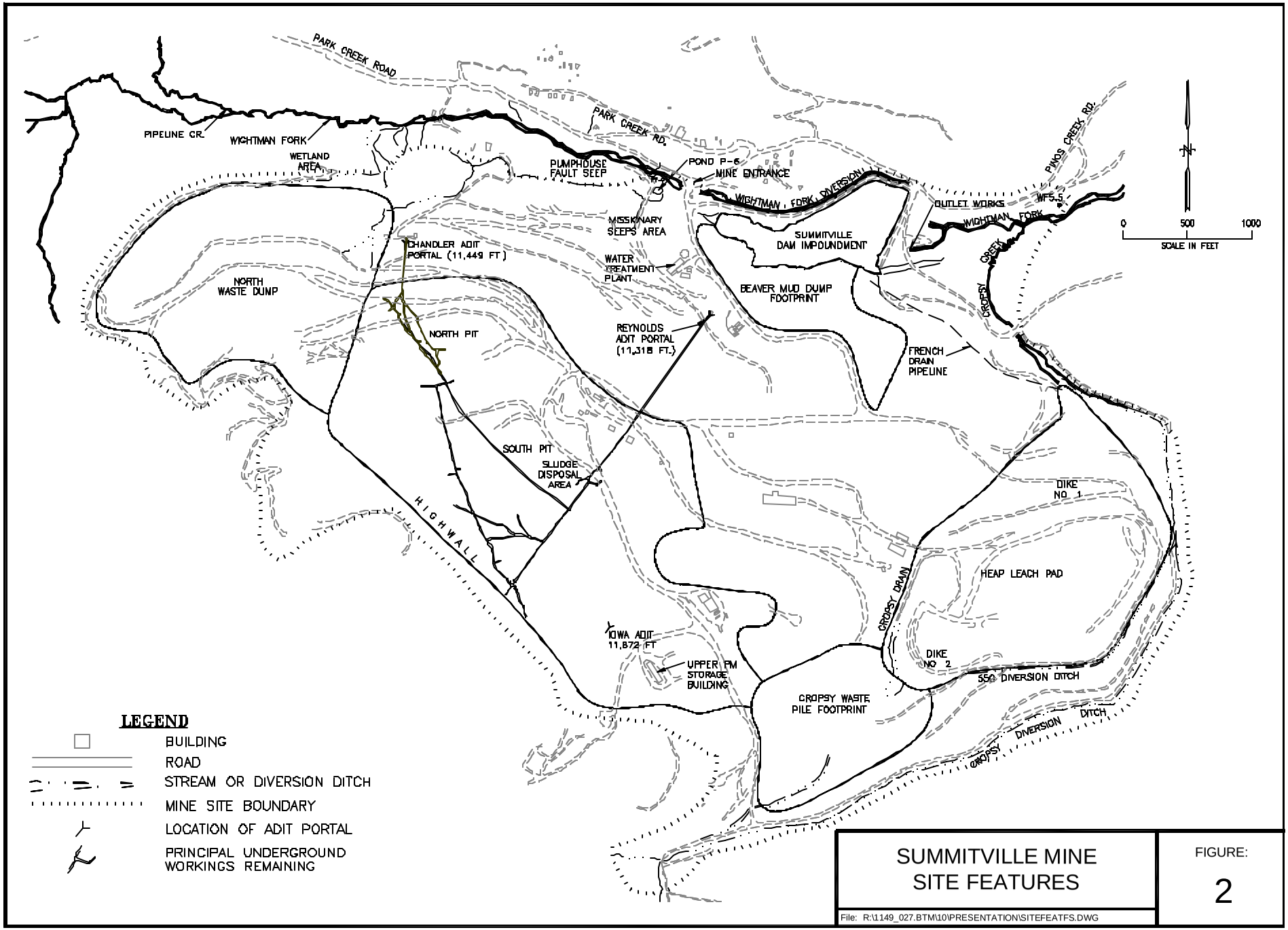

SUMMITVILLE MINE SITE FEATURES

FIGURE: 2

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EMERGENCY RESPONSE AND INTERIM REMEDIAL ACTIONS

Emergency response and interim remedial actions implemented by the EPA and the CDPHE at the site are in various stages of completion. Interim remedial actions were implemented by the issuance of ***Interim Records of Decision*** in 1994. The following summarizes the status for each.

Reynolds/Chandler Adit Plugging: When the EPA assumed control of the site in 1992, the Reynolds Adit was the largest contaminant source at the site. Consequently, it was decided to plug the Reynolds Adit. Because the Chandler Adit was connected to the Reynolds Adit, it too was plugged. Plugging of the adits has been effective in reducing the copper load from these sources by 93 percent.

Water Treatment (Operable Unit 0): In December 1992, water treatment actions were complicated by the variety of waste streams that required treatment. Consequently, water treatment was initially performed at several locations using a variety of processes. The goal of Operable Unit 0 was to consolidate water treatment during interim remedial activities, to equalize flow, and to improve water quality. Water treatment has been consolidated into one central facility. The current Water Treatment Plant uses a lime precipitation process to remove metals. On-going efforts to improve water treatment efficiency continue.

Heap Leach Pad Detoxification/Closure (Operable Unit 1): Detoxification of cyanide in the Heap Leach Pad was performed through a rinsing program from 1993 through 1996. The goals of the detoxification were to eliminate or minimize Heap Leach Pad impacts to the Alamosa River, and to eliminate or minimize the need for continued water treatment at the Heap Leach Pad. The rinsing program has removed about 98 percent of the liquid-phase cyanide from the Heap Leach Pad. The Heap Leach Pad was capped during the 1997 and 1998 construction season and vegetated.

Excavation of Cropsy Waste Pile, Beaver Mud Dump, and Summitville Mine Dam/Mine Pit Closure (Operable Unit 2): In October 1993, the EPA and the State issued a non-time critical removal action plan to remove, reduce, stabilize, and/or contain significant manmade sources of AMD from the site to prevent further releases. Four sulfide-metal bearing waste rock deposits and drainage areas were identified in the removal action plan: the Cropsy Waste Pile; the Beaver Mud Dump; the Summitville Dam Impoundment (formerly the Cleveland Cliffs Tailings Pond); and the North and South Mine Pits (Figure 2). Over five million cubic yards of mine waste materials from these areas have been excavated and placed in the mine pits. Closure of the mine pits consisted of lining the pit bottoms, and filling the pits with waste rock. Capping of the pits was completed in late 1995.

South Mountain Ground Water (Operable Unit 3): This non-time critical removal action consisted of characterizing the hydrogeology of South Mountain groundwater. This Operable Unit was incorporated into the site-wide Remedial Investigation/Feasibility Study in the late 1990s.

Site-Wide Reclamation (Operable Unit 4): Site-wide reclamation has been implemented in multiple phases over several years and is expected to be completed in 2001. Approximately 300 acres of disturbed land will ultimately be reclaimed at the site under Operable Unit 4. The goals of reclamation are to remove, reduce, stabilize, and/or contain non-point sources of AMD to prevent further releases from the site. Reclamation has involved reconfiguring disturbed areas to improve slope stability and moisture retention, and to reduce soil erosion. Amendments needed to produce a topsoil capable of promoting and sustaining plant growth have been added to the soil. Reclamation is anticipated to be 95 percent successful at reducing AMD.

SUMMARY OF SITE RISKS

Risks posed to humans by site releases have been identified in two separate risk assessment reports: the 1995 ***Baseline Human Health Risk Assessment*** and the 1997 ***Public Health Assessment*** issued by the Agency for Toxic Substances and Disease Registry. These evaluations have classified the site as having no apparent public health hazard based on ingestion and dermal contact exposure routes.

As a result of contaminant releases from Summitville, aquatic life in the Alamosa River was decimated. No sustained fish population occurs and the final remedy addresses this issue. Risks to ecological and agricultural receptors have been identified in two ***Ecological Risk Assessment*** reports: the 1995 Tier 1 Ecological Risk Assessment and the 2000 Tier 2 Ecological Risk Assessment Addendum. The Tier 2 Ecological Risk Assessment Addendum integrated and updated the results of the Tier 1 Ecological Risk Assessment. The Tier 2 Ecological Risk Assessment found that ***aquatic biota*** are at significant risk in Wightman Fork, the Alamosa River, and Terrace Reservoir. Risks are primarily driven by exposure to copper; however, exposure to zinc, iron, and low pH also contribute to risk. Some improvement in the aquatic biota community has been recently measured, but it remains severely impaired. The quality of the habitat for aquatic biota in the Alamosa River is lower than optimal, but habitat does not appear to be a limiting factor for fish or aquatic biota under current conditions. Aquatic biota accumulation of metals, particularly cadmium, copper, and zinc, appears to be highest near and in Terrace Reservoir, and may adversely affect fish survival and growth.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are remedial goals of the site-wide remedy that address migration, exposure pathways, and potential receptors of contamination from the site. The RAOs for the site-wide final remedy are presented below.

1. Control and treat surface water, ground water and leachate, as necessary, to meet State and Federal ***applicable or relevant and appropriate requirements*** (ARARs).
2. Re-establish State aquatic use classification and attainment of water quality numeric criteria in Segment 3c of the Alamosa River and downstream.
3. Ensure geotechnical stability of constructed earthen structures and slopes.
4. Mitigate erosion and transport of sediment into Wightman Fork and Cropsy Creek.
5. Control airborne contaminants from the site.

The lead agency has determined that the preferred alternative identified in this Proposed Plan has the highest probability of meeting the RAOs, is protective of public health and welfare, and protects the environment from actual or threatened releases of hazardous substances.

SUMMARY OF REMEDIAL ALTERNATIVES

The initial step in developing alternatives for the final site-wide remedy was preparation of a ***Feasibility Study Technical Memorandum***. The Technical Memorandum identified ***General Response Actions***, which are general categories of remedial technologies or process options, that can be used individually or in combination to satisfy the RAOs. The document identified 21 conceptual remedial alternatives for further evaluation.

An ***Engineering Alternatives Report*** was subsequently prepared to further evaluate and screen treatment technologies and combinations of remedial components. Each conceptual alternative was evaluated using the criteria of effectiveness, implementability and cost. Stakeholder input was also considered in the evaluation process. The Engineering Alternatives Report presented remedial alternatives that were carried forward for detailed analysis in the Feasibility Study. These alternatives are discussed below.

ALTERNATIVE 1A - No Action: In accordance with the NCP, a no-action response was retained for consideration to provide a baseline against which other technologies were compared. Implementation of the no-action alternative assumes that no other responses will be implemented following the completion of the interim remedial actions and that the remaining contaminated sources remain at the site with no plans for future control or removal. The only components of this alternative include site monitoring, maintenance and management.

Capital Costs	$0
Short-, Long-Term O&M; Periodic Costs	$9,696,000
Total 100-Year Present Value	$9,696,000
Time to Implement Remedial Action	< 1 year

ALTERNATIVE 1B - No Further Action/Summitville Dam Impoundment Breach: This alternative is similar to the no-action Alternative 1A, but includes limited construction to leave the site in a safe condition. Currently, the State Engineer requires that the embankment of the Summitville Dam Impoundment be upgraded. Because this alternative does not include water treatment or upgrade of the impoundment embankment, the State Engineer would require the embankment to be breached from a safety perspective. This would prevent a possible catastrophic failure of the embankment and release of a large volume of contaminated water. The major components include: 1) breach of the Summitville Dam Impoundment embankment; 2) minimal rehabilitation of the Reynolds and Chandler Adits; and 3) demolition of site buildings.

Capital Costs	$3,426,000
Short-, Long-Term O&M; Periodic Costs	$13,211,000
Total 100-Year Present Value	$16,637,000
Time to Implement Remedial Action	< 1 year

ALTERNATIVE 2- Clean Water Diversion/New Dam Below Confluence of Wightman Fork and Cropsy Creek/Passive Water Treatment: Alternative 2 contains no active water treatment and relies upon a large impoundment (2,503 acre-feet) to passively treat AMD from the site. This alternative was retained for consideration because it was the only passive treatment technology that could potentially treat the large volume of contaminated water from the site, even though this technology is unproven at mine sites at this large scale and altitude. The new dam for the impoundment would be constructed below the confluence of Cropsy Creek and Wightman Fork. The success of Operable Unit 4 reclamation is not critical to this alternative. The major components include: 1) construction of a new impoundment; 2) breach of the existing Summitville Dam Impoundment embankment; 3) construction of Wightman Fork and Cropsy Creek clean water diversions; 4) rehabilitation of the Reynolds and Chandler Adits; and 5) demolition of site buildings.

Capital Costs	$23,158,000
Short-, Long-Term O&M; Periodic Costs	$12,376,000
Total 100-Year Present Value	$35,534,000
Time to Implement Remedial Action	2 to 3 years

ALTERNATIVE 3 - Upgrade Summitville Dam Impoundment/Existing Water Treatment Facility with Seasonal Treatment: This alternative represents *status quo* operations at the site. It considers the long-term operation of

the existing treatment plant and pumpback system, Summitville Dam Impoundment and ditch system. The Summitville Dam Impoundment would be minimally upgraded and would maintain its current storage capacity (275 acre-feet). The Summitville Dam Impoundment would receive water as currently designed from certain hydrologic basins (total of 376 acres), excluding the Cropsy Creek basin. Water treatment would be seasonal (i.e., May through October). The major components include: 1) minimal upgrade of the existing Summitville Dam Impoundment dam; and 2) minimal upgrade of Wightman Fork Diversion to contain the 100-year storm event.

Capital Costs	$1,577,000
Short-, Long-Term O&M; Periodic Costs	$83,846,000
Total 100-Year Present Value	$85,423,000
Time to Implement Remedial Action	< 1 year

ALTERNATIVE 4 - Upgrade Summitville Dam Impoundment/New On-site Water Treatment Plant with Flexible Treatment Season: Alternative 4 considers construction of a new Water Treatment Plant closer to the Summitville Dam Impoundment and construction of a new influent delivery system (wet well). The water treatment system would have a flexible treatment season. The Summitville Dam Impoundment would be upgraded, but rerouting of on-site surface water would allow the storage of the ***design event*** (500-year thunderstorm and 100-year snow melt), without increasing its capacity of 275 acre-feet. The upgrade of site ditches would reduce the hydrologic basins tributary to the Summitville Dam Impoundment to only the ***highwall*** and the Beaver Mud Dump/Summitville Dam Impoundment basins (68 acres). Reclamation is assumed to be 100 percent effective in the remaining disturbed area of the site (504 acres). The major components include: 1) upgrade of the existing Summitville Dam Impoundment; 2) construction of a Water Treatment Plant and influent delivery system; 3) upgrade of Wightman Fork Diversion; 4) upgrade of select ditches and construction of a new highwall ditch; 5) construction of ground water interceptor drains; 6) rehabilitation of Reynolds and Chandler Adits; and 7) demolition of site buildings.

Capital Costs	$17,364,000
Short-, Long-Term O&M; Periodic Costs	$55,575,000
Total 100-Year Present Value	$72,939,000
Time to Implement Remedial Action	2 years

ALTERNATIVE 5 - New Dam Upstream of Wightman Fork-Cropsy Creek Confluence/New Gravity-Fed Water Treatment Plant with Flexible Treatment Season: Alternative 5 considers construction of a new, larger impoundment (405 acre-feet) to ensure that releases of untreated water are less likely to occur in the future. Some degree of reclamation ineffectiveness (at least 5 percent) is expected and the larger impoundment could store the additional contaminated drainage. The dam would be located just upstream of the Cropsy Creek/Wightman Fork confluence, and the impoundment would store water from the design event from the highwall and the Beaver Mud Dump/Summitville Dam Impoundment basins (68 acres). A new Water Treatment Plant would be constructed downstream of the new dam that would use a gravity-fed influent delivery system. The Water Treatment Plant would have a flexible treatment season. The major components include: 1) construction of a new dam; 2) breach of the existing Summitville Dam Impoundment embankment; 3) construction of a conventional, gravity-fed Water Treatment Plant; 4) upgrade of Wightman Fork Diversion; 5) upgrade of select ditches and construction of a new highwall ditch; 6) construction of ground water interceptor drains; 7) rehabilitation of Reynolds and Chandler Adits; and 8) demolition of site buildings.

Capital Costs	$24,150,000
Short-, Long-Term O&M; Periodic Costs	$51,259,000
Total 100-Year Present Value	$75,409,000
Time to Implement Remedial Action	2 years

COMPARISON CRITERIA

Remedial alternatives were evaluated to identify the advantages and disadvantages of each alternative relative to one another using established criteria identified in the NCP. A description of each criterion is provided below.

1. Overall protection of human health and the environment addresses whether or not a remedial alternative can adequately protect human health and the environment from unacceptable risks posed by contaminants at the site.

2. Compliance with ARARs refers to whether or not a remedial alternative can attain Federal or State environmental laws and standards.

3. Long-term effectiveness and permanence refers to the ability of a remedial alternative to prove successful and effective over time.

4. Reduction of toxicity, mobility, or volume through treatment is the degree to which an alternative reduces health risks, movement and quantity of site pollutants and contaminants.

5. Short-term effectiveness evaluates the potential impacts to human health and the environment during implementation (construction) of remedial actions.

6. Implementability is a measure of the ease or difficulty of implementing a remedial alternative, and includes technical feasibility, administrative feasibility and availability of services and materials.

7. Cost is used to compare remedial alternatives differentiating between capital costs, and operation and maintenance costs; costs are presented as ***net present value*.**
8. State acceptance refers to the State's position or concerns regarding the preferred alternative.
9. Community acceptance determines which component(s) of the alternatives interested persons in the community support, have reservations about, or oppose.

COMPARISON OF REMEDIAL ALTERNATIVES

Remedial alternatives were compared using the NCP criteria. A summary of the comparison is presented in Table 1. Predictions from a reactive transport model of Wightman Fork and Alamosa River were additionally used to assess compliance with ARARs; long-term effectiveness and permanence; and reduction of toxicity, mobility or volume through treatment. State acceptance was not used in the comparison, as this criterion applies to sites where EPA is the lead agency. Community acceptance will be determined when comments on this Proposed Plan are received.

At the time the human health assessment was conducted, impoundment and treatment of contaminated water at the site had already begun. This interim remedial action proved to be protective of human health. Therefore, the combination of an impoundment and active water treatment (Alternatives 3, 4, and 5) would be protective of human health. The level of protection of human health in Alternative 2 has not been evaluated, but is expected to be less than Alternatives 3, 4, and 5. Alternatives 1A and 1B would be even less protective of human health because water treatment is not employed.

With respect to protection of the environment, Alternative 5 offers additional impoundment capacity and the greatest level of protection of all alternatives. Additional storage capacity in Alternative 5 further reduces the possibility of untreated water being released from the site, and offers the ability to store and treat water from additional portions of the site, where reclamation is not entirely successful in reducing AMD. The reliability of the Water Treatment Plant influent delivery system in Alternative 5 is higher than that of Alternatives 3 and 4. Alternatives 1A and 1B would not be protective of the environment.

Alternative 5 has the greatest probability of achieving water quality ARARs in Alamosa River Segment 3c, which is the offsite point of compliance. Model predictions suggest that Alternatives 4 and 5 could achieve water quality standards in Alamosa River Segment 3c and in segments further downstream. Alternative 4 would have less probability of meeting water quality ARARs because it cannot store additional drainage from reclaimed areas that continue to produce AMD during the design event. Alternative 3 would continue to release untreated water to Wightman Fork during normal or above snow pack, which would have adverse effects on the downstream ecosystem. The ability of Alternative 2 to comply with water quality ARARs is unproven, because use of a large-capacity impoundment to passively treat AMD from the site has not been demonstrated. Alternatives 1A and 1B would not comply with water quality ARARs. None of the alternatives is expected to meet water quality ARARs in Alamosa River Segment 3b due to background conditions. ***Waiver*** of certain water quality standards would be required for each alternative.

The new impoundment and Water Treatment Plant in Alternative 5 provides more controls for management of contaminants from the site and is the most reliable of the alternatives on a long-term basis. Predictive modeling indicates that Alternative 5 consistently provided the lowest metals concentration and highest pH of water exiting the site. Alternative 4 is also capable of controlling site contaminants; however, without increasing the storage capacity of the Summitville Dam Impoundment, additional AMD from the site could not be stored. Alternative 3 is essentially the *status quo*, which has proven to be unreliable, resulting in releases of untreated water. The long-term effectiveness of Alternative 2 is unproven due to its reliance on large-capacity passive treatment that has not been successfully proven at mining sites. Alternatives 1A and 1B would have the lowest long-term effectiveness.

Alternatives 3, 4 and 5 incorporate similar water treatment technologies; thus, their ability to reduce the toxicity of site contaminants is similar. Alternative 5 is considered to have the highest reduction of contaminant mobility and volume because it would be able to store and treat additional AMD from areas of the site where reclamation has been unsuccessful. Alternative 4 would be less able to control releases of untreated water, and Alternative 3 would be even lower due to frequent releases of untreated water. The impoundment in Alternative 2 could potentially store the largest volume of AMD from the site, but it was considered to be less reliable than Alternatives 3, 4 and 5 at reducing toxicity, mobility or volume of contaminants because it relies on an unproven passive treatment technology. Alternatives 1A and 1B would achieve minimal reductions. These comparisons are supported by model-predicted reductions in copper concentrations at the downstream boundary of the site (Table 1).

Alternatives 2, 3, 4 and 5 would maintain the current short-term effectiveness of the existing Summitville Dam Impoundment/Water Treatment Plant system, as this system would not be taken off line until construction of the preferred alternative is complete. During implementation of each alternative, construction activities along Wightman Fork could degrade water quality on a short-term basis. Taking this into account, Alternative 3 would have the highest short-term effectiveness because disturbances within Wightman Fork would be minimal. However, releases from the Summitville Dam Impoundment in Alternative 3 could occur and would lower its

TABLE 1 - COMPARISON OF REMEDIAL ALTERNATIVES FOR SUMMITVILLE MINE SUPERFUND SITE

Comparison Criteria	Alternatives				
	1A- No Action and 1B - No Further Action/ Breach Summitville Dam Impoundment	**2 - Clean Water Diversion/New Dam Below Confluence/Passive Water Treatment**	**3 - Upgrade Summitville Dam Impoundment/Existing Water Treatment Facility with Seasonal Treatment**	**4 - Upgrade Summitville Dam Impoundment/New On-Site Water Treatment Plant with Flexible Treatment Season**	**5 - New Dam Upstream of Confluence/New Gravity-Fed Water Treatment Plant with Flexible Treatment Season**
Protection of Human Health and the Environment	Not protective of human health and the environment because significant AMD would continue.	Possibly protective of human health, but not protective of the environment because passive treatment has not proven to be effective.	Protective of human health, but not protective of the environment because significant AMD would continue	Protective of human health and the environment because most all AMD would be contained and treated.	Highest protection of human health and the environment because most all AMD would be contained and treated.
Compliance with ARARs	Does not comply with water quality ARARs; waiver of water quality standards would be required.	Compliance with water quality ARARs is unproven; waiver of water quality standards would be required.	Does not comply with water quality ARARs; waiver of water quality standards would be required.	High probability of complying with water quality ARARs; waiver of water quality standards would be required.	Highest probability of complying with ARARs; waiver of water quality standards would be required.
Long-Term Effectiveness and Permanence	Minimal long-term effectiveness; point and non-point sources would continue to discharge AMD.	Unproven due to undemonstrated reliability of passive water treatment.	Low effectiveness due to frequent releases of untreated water during years of normal to above normal precipitation; problematic water treatment.	Moderate to high effectiveness, but unable to store and treat additional AMD.	Highest because it is able to store and treat additional AMD; gravity-fed delivery system has high reliability.
Reduction of Toxicity, Mobility or Volume	Minimal reduction in mobility and volume, no reduction in toxicity.	Moderate to low reduction; 32 to 34 percent reduction in copper compared to Alternative 1B.	Moderate reductions, but frequent releases of untreated water could occur; 60 to 90 percent reduction in copper compared to Alternative 1B.	High because new Water Treatment Plant reduces volume of sludge produced, but unable to store and treat additional drainage; 86 to 97 percent reduction in copper compared to Alternative 1B.	Highest because new Water Treatment Plant reduces volume of sludge produced; able to store and treat additional drainage; 88 to 97 percent reduction in copper compared to Alternative 1B.
Short-Term Effectiveness	Least effective because contaminated sediments and AMD would immediately impact Wightman Fork.	Low effectiveness due to considerable disturbance within Wightman Fork during construction of new dam.	Moderate to high effectiveness because disturbances in Wightman Fork minimal, but releases of untreated water would significantly lower the effectiveness.	Moderate to high effectiveness because remedial action would cause minimal disturbances. Disturbances would be less than Alternative 5.	Moderate effectiveness because some disturbances within Wightman Fork would occur during construction of new dam.
Implementability	Could be readily implemented.	Least implementable due to construction of large dam and purchase of substantial water rights.	Easiest to implement because current site operations are continued with little additional work.	Moderately implementable.	Moderately implementable, requiring a greater level of effort due to the new dam.
Cost ***Total Present Value:***	Lowest total present value. ***1A - $9,696,000*** ***1B - $16,637,000***	Lowest O&M costs ***$35,534,000***	Highest total present value and highest O&M costs ***$85,432,000***	Second highest O&M costs ***$72,939,000***	Highest Capital Costs ***$75,409,000***

short-term effectiveness. Alternative 4 would have a slightly lower short-term effectiveness because construction of a new Water Treatment Plant could potentially introduce contaminants to Wightman Fork. Alternative 5 would have a slightly lower short-term effectiveness because contaminants could be released during construction of a new dam within the Wightman Fork channel. Alternative 2 would have an even lower short-term effectiveness because the dam is considerably larger and the disturbance would cause an even greater amount of contaminants to be released during construction. Alternatives 1A and 1B would have the lowest short-term effectiveness, as AMD and contaminated sediments from the Summitville Dam Impoundment would immediately enter Wigthman Fork.

Alternative 1A would be the easiest to implement because no new remedial actions are proposed. Alternative 3 would be the next easiest to implement because it is a continuation of current site operations. Alternative 1B could also be readily implemented and would not pose technical or administrative difficulties. Alternatives 4 and 5 would require a greater level of effort and the implementability of these alternatives is considered to be medium. Alternative 2 would be the most difficult to implement because of the large quantity of materials required to construct the dam and water rights that would have to be purchased to fill the impoundment.

Total costs for the final remedy would occur over two phases: 1) Remedial Action, and 2) long-term operation and maintenance (O&M). The Remedial Action phase includes the ***Remedial Design,*** remedy construction, and a period of up to 10 years of O&M until the remedy is considered complete. Following the Remedial Action phase, the long-term O&M would begin and the financial responsibility is shifted from the Federal government to the State. A 100-year period of analysis (project life) and a 4.2 percent discount factor were used.

Alternative 1A has the lowest total cost (present value), followed closely by Alternative 1B (Table 1). Alternative 2 has the next lowest total cost. Although capital costs for Alternative 2 are relatively high (second highest), the O&M costs are the lowest because active water treatment is not employed. The total cost for Alternative 4 is about double the cost of Alternative 2, and Alternative 5 is slightly higher than Alternative 4 due to construction of a new impoundment. Alternative 3 has the highest total cost and highest O&M cost, which is due continued use of the existing Water Treatment Plant and influent delivery system.

PREFERRED ALTERNATIVE

The goal of the Summitville Mine final site-wide remedy is to capture AMD, contain it in an on-site impoundment, and treat water to remove metals to achieve water quality standards in the Alamosa River. The final remedy continues the benefits achieved through the four Interim Records of Decision and further reduces and controls the AMD exiting the site.

In the evaluation of alternatives, the CDPHE and EPA have determined that little distinction exists between Alternatives 4 and 5. Both alternatives involve modifications to on-site ditches, upgrade of the Wightman Fork Diversion, adit rehabilitation, management of runoff from the highwall, relocation of the U.S. Forest Service access road, building demolition, site monitoring and maintenance. The differences between the alternatives are the location of a new Water Treatment Plant and the storage capacity of an on-site impoundment for contaminated water. The location of the Water Treatment Plant depends upon obtaining land at the appropriate location. The size of the impoundment depends upon the degree of success of the already implemented interim actions, and the margin of safety to prevent untreated releases.

Alternatives 4 and 5 evaluated against each of the seven criteria (shown in Table 1) illustrates that they are nearly identical. For these reasons, the agencies believe that Alternatives 4 and 5 are not significantly different and can be blended into a single alternative; heretofore, called the "preferred alternative." The agencies remain committed to the RAOs, previously stated as the basis for remedy selection. The components of the preferred alternative primarily consist of: 1) a dam and impoundment upstream of the Wightman Fork-Cropsy Creek confluence, and 2) a new gravity-fed Water Treatment Plant located downstream of the impoundment. The decision regarding the size of the storage impoundment is deferred as a remedial design decision pending the demonstrated performance of the site-wide reclamation (Operable Unit 4). Reclamation will be complete by the end of the 2001 field season. Because it can take a few years for reclamation to mature, data will be collected to assess the effectiveness of reclamation. The impoundment storage capacity will be based on the projected volume of runoff from the site that must be contained to meet RAO Nos. 1, 2 and 3 and to minimize or eliminate untreated releases.

The preferred alternative will be protective of human health and the environment, have the highest compliance with ARARs and achievement of RAOs among remedial alternatives, reduce contaminant volume and mobility, and have long-term effectiveness. The short-term effectiveness and implementability are considered to be moderate. The following summarizes the benefits and rationale for selection of the preferred alternative.

- Releases of untreated water from the site will be significantly reduced, if not eliminated.
- Minimizes risks to downstream ecological receptors.
- Includes a new Water Treatment Plant that employs a proven and effective water treatment technology.
- Uses a more reliable influent delivery system that requires low O&M.

- Location of the Water Treatment Plant and gravity-fed delivery system allows for a flexible treatment season (i.e., year-round if needed).
- Attains the highest level of protection of human health and the environment in the most cost effective manner.

The preferred alternative is the most ARAR compliant of the alternatives that were evaluated although some ARARs will be waived. Designated use classifications and water quality standards for the Alamosa River Segment 3c and downstream will be met. All other ARARs not specifically identified for a waiver will also be met.

WAIVER OF ARARs

The selection of the preferred alternative will require a waiver of some State of Colorado surface water standards (CDPHE, WQCC, Regulation 36, Classifications and Numeric Standards for Rio Grande Basin). It is proposed that numeric standards for pH, aluminum, and iron, and the aquatic life use classification for Alamosa River Segment 3b (mouth of Wightman Fork to Town of Jasper) be waived. The justification for waiving these standards is the analysis performed in the ***Use Attainability Assessment***, which demonstrated that the currently assigned numeric standards for this segment are unattainable under any baseline condition due to the presence of naturally occurring mineralized terrains that contribute metals and acidity to the Alamosa River. Therefore, remediation of the Summitville Mine site will be incapable of achieving these standards. Waiver of the agricultural use classification for Segment 6 (Wightman Fork) is also proposed primarily because of the inability of the final remedy to meet manganese agricultural standards. Technical impracticability is the statutory basis for waivers in Segments 3b and 6. No waivers are proposed for the remaining mainstem Alamosa River Segments 3c, 8, 9 and 10. A discussion of waivers is contained in Appendix E of the Feasibility Study report.

MONITORING OF EFFECTIVENESS

Any final remedy, and specifically this preferred alternative, will require monitoring to evaluate current and future site status, remedy performance and compliance with ARARs. Monitoring is an integral part of determining if the remedy is successful. CERCLA 300.430 (f)(4)(ii) requires that if a remedial action is selected that results in contaminants remaining on site, a review of the final remedy shall occur at intervals of no less than five years. At the five-year review the agencies determine, through the use of monitoring data, whether the remedy is and will continue to be successful. At this time, the agencies may suggest modifications to the remedy to insure continued compliance with ARARs.

To this end, the agencies are currently putting in place a detailed monitoring plan to evaluate the performance of the interim actions and will be conducting, for the purposes of developing a final remedy design, investigatory drilling to ascertain the best location for large engineered structures such as the Water Treatment Plant and the impoundment. The on-site and offsite data collected during the years 2001 and 2002, as well as historical data, will be used to size water conveyance and storage structures. Included in this monitoring is continued sampling of the Alamosa River water and sediments to assess downstream effects of remedial actions conducted at the site. There are specific regulations, standards and designated uses for water of the Alamosa River and Terrace Reservoir. However, there are no such regulations, standards or designated uses for sediments of the river and reservoir. The potential impact of sediments on the environment is measured by its affect on the water and the ability to sustain aquatic life. With the existing monitoring data and computer models, the agencies believe that meeting water quality standards in Alamosa River Segment 3c and downstream is achievable with the preferred alternative. Thus at this time, sediment remediation is not planned for either the Alamosa River nor Terrace Reservoir. The monitoring program will continue to assess the attainment of stream standards and the return of aquatic life to the river and reservoir. The five-year review will, in particular, consider the disposition of stream and reservoir sediment in as much as it prevents attainment of the stated **Remedial Action Objectives**. The agencies believe this is a reasonable approach given that Operable Unit 4 reclamation will be completed this year and must be allowed time to mature. In addition, the preferred alternative collects the majority of the contaminated water generated at the site and prevents or eliminates untreated releases. Thus, significant improvement in the downstream aquatic environment is expected as a result of these actions.

ACRONYMS

AMD	Acid mine drainage
ARARs	Applicable or Relevant and Appropriate Requirements
CDPHE	Colorado Department of Public Health and Environment
EPA	United States Environmental Protection Agency
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
O&M	Operations and Maintenance
RAOs	Remedial Action Objectives
WQCC	Water Quality Control Commission

GLOSSARY

Acid Mine Drainage - mining disturbances that result in surface water or ground water having a low (acidic) pH generally less than 4 standard units and elevated dissolved metals concentrations.

Administrative Record - The body of documents associated with characterization and remedy selection at a site.

Applicable or Relevant and Appropriate Requirements - Federal and State requirements for cleanup, control and environmental protection that a remedial action will meet.

Aquatic biota - Organisms living in surface water including fish, macroinvertebrates, and zooplankton.

Baseline Human Health Risk Assessment - A study that determines and evaluates risk that site contamination poses to human health.

Capital costs - Expenditures initially incurred to build or install the remedial action.

Design Event - Used to size impoundment storage and diversion ditches, taking into account precipitation and snow melt runoff; includes the 100-year snow melt (over 60 days) and 500-year thunderstorm (over 24 hours).

Ecological Risk Assessment - Study that assesses risks to aquatic, terrestrial and agricultural receptors posed by contaminant releases from a site.

Engineering Alternatives Report - Supplemental document that evaluates conceptual remedial alternatives on an engineering basis, resulting in a selection of preferred alternatives for detailed evaluation in the Feasibility Study.

Feasibility Study - Identifies and evaluates the appropriate technical approaches and treatment technologies to address contamination at a site.

Feasibility Study Technical Memorandum - Initial document that assembles and preliminarily evaluates possible alternatives for the final site-wide remedy.

General Response Actions - General categories comprised of remedial technologies, or process options, that are taken individually or in combination to satisfy the remediation goals.

Highwall - The unexcavated face of exposed rock resulting from open-pit mining.

Interim Record of Decision - Document that specifies a response action to be implemented prior to final remedy selection.

Metals loading - Mass of metals in surface water or groundwater; typically measured in pounds per day.

National Oil and Hazardous Substance Pollution Contingency Plan - Regulations governing cleanups under EPA's Superfund program.

National Priorities List - EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for cleanup under the Superfund program.

Net present value - Current cost to construct and operate a response action over the project life, subject to a specified discount rate.

Operable Unit - A distinct portion or action at Superfund site.

Periodic costs - Costs that occur only once every few years during the O&M period; may be either capital or O&M costs.

Preferred alternative - Final remedial alternative that meets NCP evaluation criteria and is supported by regulatory agencies.

Proposed Plan - A notification document requesting public input on a proposed remedial alternative.

Public Health Assessment - Assessment of risks posed to human health by releases of contaminants from a site.

Remedial Action - Action(s) taken to correct or remediate contamination.

Record of Decision - A document that is a consolidated source of information about a Superfund site, the remedy selection process, and the selected remedy.

Remdial Action Objectives - Remediation goals for protection of human health and the environment.

Remedial Design - Engineering design and evaluation phase prior to implementation of a Remedial Action.

Remedial Investigation - A study conducted to identify the types, amounts and locations of contamination at a site.

Short- and long-term O&M costs - Post-construction costs necessary to ensure or verify the continued effectiveness of a remedial action.

Use Attainability Assessment - A document prepared for the Water Quality Control Commission in support of recommended changes to the underlying numeric stream standards for the Alamosa River.

Waiver - A notice of intent to not commit to meeting a specific regulatory requirement, standard, etc.

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